

EXHIBIT 9

**UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

ULTRAVISION TECHNOLOGIES, LLC,

Plaintiff,

v.

HOLOPHANE EUROPE LIMITED, ACUITY
BRANDS LIGHTING DE MEXICO S DE RL
DE CV, HOLOPHANE, S.A. DE C.V. AND
ARIZONA (TIANJIN) ELECTRONICS
PRODUCTS TRADE CO. LTD.,

Defendants.

Case No. 2:19-cv-00291-JRG-RSP
(LEAD CASE)

ULTRAVISION TECHNOLOGIES, LLC,

Plaintiff,

v.

YAHAM OPTOELECTRONICS CO., LTD.,

Defendant.

Case No. 2:19-cv-00398-JRG-RSP

ULTRAVISION TECHNOLOGIES, LLC,

Plaintiff,

v.

SAMSUNG ELECTRONICS CO., LTD.,

Defendant.

Case No. 2:19-cv-00252-JRG-RSP

**DECLARATION OF DR. JACK JOSEFOWICZ WITH
REGARD TO CERTAIN CLAIM CONSTRUCTIONS**

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	EXPERIENCE AND QUALIFICATIONS	2
III.	LEGAL STANDARDS	4
A.	Claim Construction	4
B.	Indefiniteness	5
IV.	MATERIALS REVIEWED.....	5
V.	PRIORITY DATES OF ASSERTED PATENTS	6
VI.	PERSON OF ORDINARY SKILL IN THE ART.....	6
VII.	OVERVIEW OF THE ASSERTED PATENTS	7
VIII.	CLAIM TERMS IN DISPUTE.....	8
A.	“substantially transparent”	8
B.	“substantially the entire display surface”.....	12
C.	“substantially no illumination”/ “areas beyond edges . . . receive substantially no illumination”	16
D.	“substantially uniform” / “substantially equal level of illumination”, “a uniformity . . . remains substantially unchanged” or “the uniformity of light . . . remains substantially the same.”	18
E.	“minimal amount of illumination”/ “areas beyond edges ... receive minimum illumination”	24
F.	“desired [uniformity ratio]”	25
G.	“[optics panel is configured to be attached to] a heat sink comprising a power supply enclosure disposed on the heat sink”	28

I, Dr. Jack Josefowicz, hereby declare as follows:

I. INTRODUCTION

1. My name is Dr. Jack Josefowicz, and I have been retained as an expert witness on behalf of Defendants Holophane Europe Limited, Acuity Brands Light De Mexico S De RL De CV, Holophane S.A. De C.V., Arizona (Tianjin) Electronics Products Trade Co. LTD. (“Holophane Defendants”).

2. I have been informed that Ultravision Technologies, LLC (“Ultravision” or “Plaintiff”) has brought a patent infringement lawsuit against Defendants in the United States District Court for the Eastern District of Texas. I understand that claims 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 25, and 26 of U.S. Patent No. 8,870,410 (the “’410 Patent”); claims 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 16, 17, and 18 of U.S. Patent No. 8,870,413 (the “’413 Patent”); claims 19 and 20 of U.S. Patent No. 9,734,738 (the “’738 Patent”); claims 1, 2, 3, and 8 of U.S. Patent No. 9,947,248 (the “’248 Patent”); and claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 29, and 30 of U.S. Patent No. 10,223,946 (the “’946 Patent”) are asserted against the Holophane Defendants, Yaham Optoelectronics Co., LTD. (“Yaham”) and/or Samsung Electronics Co. Ltd. (“Samsung”) (collectively “Defendants”).¹ I may collectively refer to these patents and claims as the “Asserted Patents” or “Asserted Claims” respectively.

3. I have been asked by Defendants to provide my expert opinions relating to certain terms and phrases appearing in the Asserted Claims of the Asserted Patents. I am being compensated at my standard consulting rate of \$550 per hour plus reimbursement for expenses.

¹ I have been informed that only the ’410 patent is asserted against Samsung, only the ’410, ’413, and ’946 patents have been asserted against the Holophane defendants, and that only the ’410, ’413, ’738 and ’248 patents have been asserted against Yaham. Where I refer to “Defendants” positions in my declaration for a particular claim term, I understand that only those defendants against whom the relevant claims are asserted are advocating those particular positions.

No portion of my compensation is dependent or otherwise contingent upon the results of this matter or the specifics of my testimony.

4. My opinions are set forth in this declaration and are based on my general knowledge and experience, as well as the materials listed below in Section IV. I submit this declaration in connection with Defendants' Joint Claim Construction and Prehearing Statement.

II. EXPERIENCE AND QUALIFICATIONS

5. I received a B.Sc. in Mathematics and Physics from Concordia University, Montreal, in Montreal, Quebec, Canada, in 1969. In 1975, I earned my Ph.D. in Physics from the University of Waterloo, in Waterloo, Ontario, Canada. In 1975, I secured the position of Research Associate at Harvard University in Cambridge, Massachusetts.

6. In my tenure as senior scientist at Hughes Research Laboratories (1984-1996), I designed and innovated new thin film deposition methods and techniques used in semi-conductor device fabrication. I have extensive experience in thin film coating methods (atomic and molecular layer by layer deposition processes; quantum well structures; epitaxial growth and lattice matching) including electron beam deposition of metals, semi-conductors, optical coatings, and insulators. I designed equipment that performed the multi-target sputtering of metals and semi-conductors, thermal evaporation depositions of metals and insulators and semi-conductors, radio frequency (RF) plasma deposition of metals, semi-conductors and insulators, as well as spin coating techniques in photolithography and electron beam lithography. I also have extensive experience in surface science of thin film properties, including optical and electronic applications for light emitting diode (LED) device design and my previous work with doping of semiconductors and the fabrication of P-N junctions apply directly to the functionality of LEDs, LED light fixture design and optimization, LED Light Engine printed circuit boards (PCB), advanced electronics for LED power supply drivers and controllers, electronic system prediction analysis for reliability,

semiconductor materials and design for high reliability of design in P-N junctions such as LED devices, and lithium ion battery development for space satellites.

7. During my tenure at Tyco Electronics as Director of Technology and R&D (1996-2008), I headed divisions including advanced and high reliability design of PCB, including metal core PCBs used in LED light engines and power supply drivers, PCB thin film surface mount finishes, design for reliability including those specific for LED light engines, process manufacturing optimization, design for manufacturability, and automation of complex process manufacturing in facilities at 9 Tycoelectronics manufacturing factories, including “best practice”, statistical process control (SPC), and reliability testing.

8. In 2008, I helped found LED Roadway Lighting (LRL) Limited. During my time at LRL, which lasted through 2012, I worked as Executive VP, Technology Solutions and Head of R&D. As Executive VP of Technology, I led a team of physicists and engineers, including electrical and mechanical engineers, in the invention and development of new globally acclaimed high efficiency and high reliability LED street lights, including electronics power supply driver, LED control systems including dimming and on/off controls, optics design, and fixture housing design for optimized thermal management. I also directed the qualification of suppliers for all the components that included electronic devices and components, PCB suppliers, die cast and mold design. I led a team in lean manufacturing, as well as design for manufacturing, parts and system integration in the manufacturing of the new LED lights.

9. I am currently an independent consultant, working in the fields of LED devices, LED lighting, and aerospace electronic industries. I have extensive experience in semi-conductor electronics, optical materials, electronic micro-devices, and electronic systems design. I also have extensive experience in designing, engineering, and developing specifications for LED surface

mounting, including layout of discrete LEDs, selection and design of printed circuit material for LED light engines (metal core PCBs) and design for surface mounting, the selection and specification of surface-mount pad materials and surface coating. I am a listed inventor of 22 patents, including LED related technology, and am an author of over 50 refereed academic science journals, and commercial publications, and presentations. My curriculum vitae, attached to this declaration as Appendix A, sets forth details of my background and relevant experience.

10. Based on my hands-on experience and education, I believe that I am to provide an opinion as to what a person of ordinary skill in the art would have understood, known, and concluded regarding the subject matter of the Asserted Patents at the time of the alleged invention.

III. LEGAL STANDARDS

11. I am not an attorney. However, the laws of claim construction and indefiniteness have been explained to me, and my understanding is as follows.

A. Claim Construction

12. I understand that the claims of a patent define the limits of the patentees' exclusive rights. In order to determine the scope of the claimed invention, courts typically construe (or define) claim terms, the meaning of which the parties may dispute. I understand that claim terms should generally be given their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention and after reading the patent and its prosecution history.

13. However, I further understand that claims must be construed in light of and consistent with the patent's intrinsic evidence. Intrinsic evidence includes the claims themselves, the written disclosure in the specification, the patent's prosecution history, including the prior art that was considered by the United States Patent and Trademark Office ("USPTO"), and the prosecution history of related patents including patents that share the same specification as the

patent-at-issue. I understand that extrinsic evidence may also be considered when construing claims and that evidence may include, for example, technical dictionaries, treatises, and expert testimony. I understand, however, that extrinsic evidence may not be relied on if it contradicts or varies the meaning of claim language provided by the intrinsic evidence.

B. Indefiniteness

14. I understand that the claims of a patent are presumed to be valid, and that invalidity of a claim must be proven by clear and convincing evidence.

15. I understand that a claim limitation is indefinite if the claim, when read in light of the specification and the prosecution history, fails to inform with reasonable certainty persons of ordinary skill in the art about the scope of the claimed invention.

16. For a claim that employs a term of degree to comply with the definiteness requirement, I understand that the claim, when read in light of the specification and prosecution history, must inform one of skill in the art of the objective boundaries of the claim. I further understand that the degree of precision required for a claim to avoid indefiniteness depends on the subject matter that is covered by the claim and whether the term at issue has a well-understood meaning in the relevant technical field.

IV. MATERIALS REVIEWED

17. In preparing this declaration, I considered the following materials:

- '410 Patent and file history
- '413 Patent and file history
- '738 Patent and file history
- '248 Patent and file history
- '946 Patent and file history

- U.S. Provisional Patent Application No. 61/677,340
- U.S. Provisional Patent Application No. 61/677,346
- Any other materials cited in my declaration.

V. PRIORITY DATES OF ASSERTED PATENTS

18. I understand that Ultravision contends in its Infringement Contentions that the Asserted Patents have a priority date of July 30, 2012 (the filing dates of U.S. Provisional Application Nos. 61/677,430 and 61/677,346). I further understand that, with the exception of the respective “Related Applications” and “Summary” sections, the Asserted Patents share a common specification.

19. In forming my opinions, I considered the level of knowledge, skill and common terminology used by persons of ordinary skill in the art (POSITA) as of the time of the invention (July 30, 2012).

VI. PERSON OF ORDINARY SKILL IN THE ART

20. I understand from Defendants’ counsel that terms in the Asserted Claims must be read as they would have been understood by a POSITA at the time of the invention. *See* paragraphs 18-19 above.

21. I have also been advised that a POSITA is a hypothetical person to whom the claimed subject matter pertains with the capability of understanding the scientific and engineering principles applicable to the pertinent art. I understand that the following factors may be considered in determining the level of ordinary skill: type of problems encountered in the art; prior art solutions to those problems; speed with which innovations are made; sophistication of the technology; and educational level of active workers in the field. I also understand that not every factor may be present and that one or more factors may predominate.

22. In my opinion, a POSITA would have had at least a bachelor's degree in physics, engineering, or a related technical field, and at least 3-4 years of experience in the field of light emitting diode (LED) devices, or an equivalent advanced education in the field of LED devices. That person would likely have been a person familiar with and taken courses related to semiconductor physics as it relates to light emitting P-N junctions, optics design for both the LED devices as well as the LED luminaires, and power supply driver electronics design. That person would have had working knowledge of LED lighting standards and design manufacturing experience related to those standards. Graduate education could substitute for professional experience, and significant work experience could substitute for formal education. For purposes of assessing this level of ordinary skill in the art, I have considered the types of problems encountered in the art, the prior solutions to those problems found in prior art references, the speed with which innovations were made at that time, the sophistication of the technology, and the level of education of active workers in the field.

23. Based on my above-described experiences, I was a POSITA in this field before July of 2012. My analysis and conclusions as expressed herein are thus based on the perspective of a POSITA having this level of knowledge and skill at the time of the alleged invention of the Asserted Patents.

VII. OVERVIEW OF THE ASSERTED PATENTS

24. The Asserted Patents relate to LED lighting assemblies for billboards. The common specification for the Asserted Patents describes that one problem for illuminating “billboards, such as those commonly used for advertising in cities and along roads”, is that “it can be difficult to direct light only onto the surface an even more difficult to do so evenly.” ’410 Patent, 1:66-67; 2:49-51. The Asserted Patents explain that billboards refer to any type of sign, which typically have a picture and/or text that must be externally illuminated. *Id.* Specifically, the

Asserted Patents describe “[o]ne problem with uneven illumination is that certain parts of the surface may be more brightly illuminated than other parts” creating undesirable “hotspots.” *Id.*, 2:55-58. Furthermore, the Asserted Patents identify that LEDs in an “exterior lighting environment”, such as billboard lighting, have “issues such as heat dissipation and protecting the LEDs against environmental conditions such as moisture.” *Id.*, 2:65-3:1.

25. To solve the problems described above, the Asserted Claims describe a lighting assembly having an “optics panel” that is designed “so that the light emitted from each LED is projected onto the entire surface of the billboard.” *Id.*, 5:4-6. According to the Asserted Patents, an advantage of this design is that “if all other LEDs were switched off except for a single LED, the entire surface would be illuminated at the level of illumination provided by a single LED.” *Id.* 5:4-9. The Asserted Patents describe that “when one or more LEDs fail, the overall illumination decreases, but the uniformity maintains the same uniformity.” *Id.*, 5:19-21. The Asserted Patents further describe that an advantage of this design is that light is not directed beyond the edges of the billboard creating a more efficient lighting assembly while reducing light pollution. *Id.* 2:58-64.

VIII. CLAIM TERMS IN DISPUTE

A. “substantially transparent”

Ultravision’s Proposed Construction	Defendants’ Proposed Construction
<i>plain and ordinary meaning or, in the alternative</i> “clear”	Indefinite

26. The term “substantially transparent” appears in at least the following claims: ’410 Patent, claims 1 and 13; ’413 Patent, claims 5, 11 and 18.

27. The term “substantially transparent” is used in the context of describing the transparency of a substrate, and thus describes the amount of light that the substrate material allows to pass through. The term arises in the following asserted claim limitations of the ’410 Patent:

- Claim 1: “a ***substantially transparent*** substrate comprising a plurality of optical elements disposed over the plurality of LEDs and configured to direct light from each of the plurality of LEDs of the lighting assembly onto a display surface external to the optics panel, the display surface having a predetermined bounded area, wherein each of the plurality of optical elements comprises a first lens element and a second lens element disposed over the first lens element”
- Claim 13: “The panel of claim 10, further comprising a ***substantially transparent*** substrate, wherein the plurality of lenses protrude outward from a major surface of the substantially transparent substrate, the substantially transparent substrate disposed over the plurality of LEDs.”

The term arises in the following asserted claim limitations of the ’413 Patent:

- Claim 5: “The panel of claim 10, further comprising a ***substantially transparent*** substrate, wherein the plurality of lenses protrude outward from a major surface of the substantially transparent substrate, the substantially transparent substrate disposed over the plurality of LEDs.”
- Claim 11: “An optics panel for use in a light emitting diode (LED) lighting assembly for illuminating a billboard that has a display surface extending between outer edges of the billboard, the optics panel comprising: a plurality of LEDs directed toward the display surface; and a ***substantially transparent*** substrate comprising a plurality of optical elements protruding outward from a major surface of the ***substantially transparent*** substrate, the ***substantially transparent*** substrate disposed over the plurality of LEDs”
- Claim 18: “The panel of claim 16, wherein the plurality of optical elements are disposed in an ***substantially transparent*** acrylic substrate.”

28. In my opinion, the term “substantially transparent” in the Asserted Patents is indefinite. The patent provides no guidance on how opaque the substrate can be to still qualify as “substantially transparent.” Likewise, I disagree with Ultravision’s construction of “substantially transparent” as “clear” because it writes out of the claim the word “substantially” and replaces the word “transparent” with its synonym “clear”, which is unnecessary. Because the degree of transparency is a parameter relevant to the design of optical lenses used to direct LED device

radiation, it needs to be capable of being measured using a definitive and analytical definition. “Substantially” transparent does not meet this design criteria and would not be reasonably certain to a POSITA.

29. I have reviewed each instance where the Asserted Patents describe the transparency of a substrate material, and these disclosures do not provide guidance as to what it means to be “substantially transparent.”

30. The '410 and '413 Patents discuss the transparency of the substrate material. In two instances, the substrate is described as being “transparent,” without any modifier. And in one instance, the substrate is described as being “substantially transparent,” but there is no explanation of what is meant by “substantially transparent” or how it differs from transparent.

- '410 Abstract and 1:21-29; '413 Abstract and 1:26-34: A ***substantially transparent substrate*** is disposed over the plurality of LEDs and configured to direct light from each of the plurality of LEDs of the lighting assembly onto a surface having a predetermined bounded area. Light from each of the LEDs is directed by the ***transparent substrate*** across the entire area of the surface so that each LED illuminates substantially the entire surface with a substantially equal level of illumination per LED.
- '410 5:28-33; '413 5:35-40: Overlying the board and LEDs 416 is ***transparent lens substrate*** 520. This substrate 520 has a plurality of lens structures 522, each associated with one of the LEDs 416, such that each of the LEDs 416 has the light emitted therefrom directed outward towards the surface, each lens structure being substantially the same.

Neither of these disclosures provides any guidance on the acceptable level of transparency. In the context of optics material used for lenses to direct LED radiation, it is critical that transparency have a defined value since the value has impact on the illumination distribution intensity as well as the efficacy of the luminaire as a whole.

31. Based on my experience, it is my opinion that a POSITA likewise would not be informed by his or her experience as to what qualifies as substantially transparent, as that phrase

is used in the claims. There are a multitude of approaches one could take to deciding how much is “substantially transparent” when designing a lighting module. For example, it is common practice to use testing equipment such as an integrating sphere to determine the overall loss factor for LEDs in a luminaire with and without the optics present on a LED device or a LED luminaire. This test with and without optics present determines the quantitative value for the transparency of the optical component used for redirecting LED radiation. The transparency of the optical component critically influences the efficacy of the LED device or LED luminaire. Further, when designing the optics for LED devices or LED luminaires using ray trace analysis, the transparency specific to the optical component must be defined as an important variable in order for the lens design to conform to reality and what the illumination levels required by the lenses should produce.

32. Because neither the Asserted Patents nor industry experience provide a POSITA with any guidance on what is meant by “substantially transparent,” a POSITA would not be reasonably certain about the scopes of the claims containing this phrase. For example, one could deviate from a transparent substrate by using a substrate material that allows 95% of the light to pass through. Does that substrate qualify as substantially transparent? The Asserted Patents do not identify any standard against which 95% transparency can be judged to determine if it qualifies as “substantially transparent.”

33. Ultravision’s alternative proposal to construe “substantially transparent” as “clear” also does not resolve the ambiguities of the term. According to Merriam-Webster’s Collegiate Dictionary (11th ed.), “clear” is a synonym for “transparent.” If Ultravision’s construction of “substantially transparent” is “clear” and if “clear” is a synonym for “transparent”, Ultravision’s construction would effectively mean that there is no difference between “substantially transparent” and “transparent.” Additionally, to a POSITA who understands the significance of optics used to

redirect LED radiation, since no material has a transparency of 100%, it is assumed that there will be some level of loss as light from LEDs pass through it. The use of generic terms such as “clear” or “transparent” or “substantially transparent” do not have the analytical definition of what the value for those terms is since they must be something less than 100%, and that specific value for those terms must be defined by a value relative to an experimental test such as would be determined using an integrating sphere.

34. To the extent that Ultravision’s proposed alternate construction is intended to exclude colored lenses, there is no suggestion in the Asserted Patents that “substantially transparent” relates to whether a structure is colored. Whether the lenses are colored or not colored, a POSITA would have the same opinion about the uncertainty and indefiniteness of what “clear” means as it relates to an analytically defined value as would be determined using an integrating sphere.

B. “substantially the entire display surface”

Ultravision’s Proposed Construction	Defendants’ Proposed Construction
<i>plain and ordinary meaning</i>	Indefinite

35. The term “substantially the entire display surface” appears in at least the following claims: ’410 Patent, claims 1, 15, and 21.

36. In my opinion, the term “substantially the entire display surface” in the ’410 Patent is indefinite. In particular, a POSITA would not be able to determine with reasonable certainty the scope of the claim because the Asserted Patents provide no guidance on how one could determine how much of the display surface needs to be illuminated to satisfy the claims. Likewise, there is no guidance in the field of lighting on which a POSITA would rely to assess how much of a display surface must be illuminated to qualify as “substantially the entire display surface.”

37. The term “substantially the entire display surface” is used in the context of LEDs illuminating a display surface in the ’410 Patent claim limitations. The term arises in the following asserted claim limitations of the ’410 Patent:

- Claim 1[c]: “wherein the light from each of the LEDs is directed through the first lens element and the second lens element across the entire area of the display surface so that each LED evenly illuminates *substantially the entire display surface* with a substantially equal level of illumination from each of the LEDs.”
- Claim 15[c]: “wherein the light from each of the LEDs is directed by the acrylic material substrate across the entire area of the display surface so that each LED evenly illuminates *substantially the entire display surface* with a substantially equal level of illumination from each of the LEDs.”

38. I have reviewed each instance where the ’410 Patent describes shining light onto the display surface, and none of these disclosures provide any guidance as to what it means to illuminate “substantially the entire display surface.”

39. The ’410 Patent discloses LEDs shining light onto the entire display surface:

- 5:36-38: “The lens structure 522 is designed to create the 3:1 uniformity and also, the lens structure is designed to “direct” the light from an edge of the surface to cover *the entire surface*.”
- 5:46-48: “With such a design, the lighting assembly can be disposed at an edge of the surface to illuminate *the entire surface*.”
- 5: 50-64: “Each lighting assembly may be powered by a separate power supply (not shown), and may be configured to illuminate the *entire surface 102*. In such an embodiment, if one power supply fails, the remaining lighting assembly 110 will still illuminate the *entire surface 102*, although at a lesser intensity than when both lighting assemblies 110 are functioning. This provides evenly distributed illumination when both lighting assemblies 110 are functioning correctly, and continues to provide evenly distributed illumination when one lighting assembly 110 malfunctions. Accordingly, the *entire surface 102* of the billboard 100 may be illuminated even when an entire lighting assembly 110 has malfunctioned and is providing no illumination at all due to the redundancy provided by configuration of the lighting assemblies 110.”
- 5:65-6:4: “Furthermore, in some embodiments as described above, each LED 416 of a single lighting assembly 110 may be configured via the optical elements 514 to illuminate the *entire surface 102*. In such embodiments, if one or more LEDs 416 or strings of LEDs fails, the remaining LEDs 416 will still illuminate the *entire*

surface 102, although at a lesser intensity than when the failed LEDs 416 are functioning.”

- 6:44-47: “Accordingly, changes in any of these factors may entail a change in the design of the lens panel 500 in order to again evenly distribute the illumination provided by each LED 416 across the *entire surface 102*.”

Because these disclosures require that light illuminate the entire display surface, and nothing less, these disclosures do not provide guidance on how a POSITA could determine how much of the display surface qualifies as “substantially the entire display surface.”

40. The ’410 Patent also discloses light being shone onto “some or all” of the display surface:

- 2:23-27: “One or more lighting assemblies 110 may be coupled to the walkway 108 (e.g., to a safety rail or to the walkway itself) and/or to another structural member of the billboard 100 to illuminate *some or all of the surface 102* in low light conditions.”

This disclosure does not specify how much “some” of the display surface is, and therefore does not provide any explanation of what it means to illuminate “substantially the entire display surface.” Moreover, the reference to “all” of the display surface does not provide guidance for what is “substantially the entire” display surface. Instead, this statement confirms that the inventors drew a distinction between all of the surface and less than all of the surface. Accordingly, this would inform a POSITA that “substantially the entire display surface” does not mean “the entire display surface.”

41. The ’410 Patent also discloses light being shone onto specific portions of the display.

- 5:21-25: “Also, as described hereinabove, the “surface” refers to the surface that is associated with a particular LED panel. It may be that *an overall illuminated surface is segmented and multiple panels are provided, each associated with a particular segment*.”
- 6:12-20: “It is understood that some embodiments may direct substantially all illumination from a lighting assembly 110 evenly across the surface 102 while some

illumination is not evenly distributed. For example, substantially all LEDs 416 may be directed to each evenly illuminate the surface 102 with the exception of a relatively small number of LEDs 416. In such cases, *the illumination provided by the remaining LED or LEDs 416 may be directed to one or more portions of the surface 102.*”

- 6:23-30: For example, *the lighting assembly 110 may be configured to direct the illumination provided by one LED 416 to only the left half of the surface 102, while directing the illumination from another LED 416 to only the right half of the surface 102.*”

These disclosures are directed to approaches where certain LEDs or LED panels are directed to specific portions of the display surface, without any indication of what percentage of the display surface the lights are directed to. Without an indication of how much of the surface is illuminated by each LED/LED panel, these disclosures do not provide any explanation of what it means to illuminate “substantially the entire display surface.”

42. Finally, the ’410 Patent states twice that light is shone onto “substantially the entire surface” outside the claims:

- Abstract and 1:25-29: “Light from each of the LEDs is directed by the transparent substrate across the entire area of the surface so that each LED illuminates *substantially the entire surface* with a substantially equal level of illumination per LED.”

This repeated disclosure provide no more guidance than the claim language itself.

43. Similar to the Asserted Patents, I am not aware of the billboard lighting industry having defined or providing guidance as to what is meant by “substantially the entire display surface.” For example, although the IES Lighting Handbook provides recommended illuminance levels for billboards, those guidelines do not address illuminance levels for anything less than the entire display surfaces.

44. Because neither the patent nor the industry practice and guidelines provide any guidance on what is meant by “substantially the entire display surface,” a POSITA would not be

reasonably certain about the scopes of the claims containing this phrase. For example, one could deviate from shining light onto the entire display surface by shining the light onto 95% of the display surface, rather than 100% of the display surface. While 100% of the display surface is clearly the entire display surface, does shining the light onto 95% of the display surface still qualify as “substantially the entire display surface”? Would LED light that radiates on 90% or 85% of the display surface still qualify as “substantially the entire display surface”? A POSITA would not be able to determine with reasonable certainty the full scope of the claims and what qualifies as “substantially the entire surface of the billboard.”

C. “substantially no illumination”/ “areas beyond edges . . . receive substantially no illumination”

Ultravision’s Proposed Construction	Defendants’ Proposed Construction
<i>plain and ordinary meaning</i>	Indefinite

45. The term “substantially no illumination”/ “areas beyond edges . . . receive substantially no illumination” appears in at least the following claims: ’410 Patent, claims 7, 12, 19, 25; ’413 Patent, claims 2, 17.

46. As an initial matter, the term “substantially no illumination” is used in the context of preventing illumination beyond the edges of the display surface in the ’410 and ’413 Patent claim. The term arises in the following asserted claim limitations of the ’410 Patent:

- Claim 7: “The panel of claim 1, wherein ***areas beyond edges*** of the display surface ***receive substantially no illumination*** from each of the LEDs.”
- Claim 19: “The panel of claim 15, wherein ***areas beyond edges*** of the display surface ***receive substantially no illumination*** from each of the LEDs.”

The term arises in the following asserted claim limitations of the ’413 Patent:

- Claim 2: “The panel of claim 1, wherein the areas beyond the edges of the display surface receive ***substantially no illumination*** from each of the LEDs.”
- Claim 17: “The panel of claim 16, wherein the areas beyond the edges of the display surface receive ***substantially no illumination*** from each of the LEDs.”

47. In my opinion, the term “substantially no illumination” in the ’410 and ’413 Patents are indefinite. In particular, the Asserted Patents do not provide guidance on how much light may be shone on an area and still qualify as substantially no illumination.

48. I have reviewed each instance where the Asserted Patents describe illumination beyond the edges of the display surface, and none of these disclosures provide any guidance as to what it means to illuminate with “substantially no illumination” in areas beyond edges of a display surface.

49. The ’410 and ’413 Patents disclose that a problem with the prior art was that, when a display surface was evenly illuminated, light would end up being directed past the edges of the display surface, and that this light is then wasted:

- ’410 2:58-64 and ’413 2:65-3:4: “***Attempting to evenly illuminate the surface 102 may cause light to be directed past the edges 112, 114, 116, and 118*** as attempts are made to balance out hot spots in particular areas. However, light that does not strike the surface 102 is wasted and may create problems (e.g., light pollution), as well as waste illumination that could be used for the surface 102.”

50. To address this problem, the patents disclose that areas beyond the edges of the display surface would receive “no illumination at all or at least a minimal amount of illumination.”

- ’410 5:9-14 and ’413: 5:16-21 “In one embodiment, the rectangular target area of the surface 102 would be evenly illuminated by the LED 416, while ***areas beyond the edges 112, 114, 116, and 118 would receive no illumination at all or at least a minimal amount of illumination from the LED 416.***”

The reference to “no illumination,” while clear, does not provide guidance on how one could deviate from receiving no illumination and still be receiving “substantially no illumination.”

51. Likewise, the reference to “minimal illumination” would not inform a POSITA about what amount of illumination is allowed to go beyond the edges of the display, as I further explain in Section VIII.E.

52. Because neither the patent nor the industry provide any guidance on what is meant by “substantially no illumination” and “areas beyond edges . . . receive substantially no illumination,” a POSITA would not be reasonably certain about the scopes of the claims containing these phrases. In the context of the these indefinite terms, in order for a POSITA to understand what light level relates to “substantially no illumination” it would be expected to have quantified values as determined by a certified calibrated light meter as to how many foot candles constitute substantially no illumination all around the edges of the billboard.

D. “substantially uniform” / “substantially equal level of illumination”, “a uniformity . . . remains substantially unchanged” or “the uniformity of light . . . remains substantially the same.”

Ultravision’s Proposed Construction	Defendants’ Proposed Construction
“does not create noticeable unevenness, such as hot spots and dead spots”	Indefinite

53. The term “substantially uniform” / “substantially equal level of illumination”, “a uniformity . . . remains substantially unchanged” or “the uniformity of light . . . remains substantially the same” appears in at least the following claims: ’410 Patent, claims 1, 10, 15, 21; ’738 Patent, claim 19; ’248 Patent, claim 3; ’946 Patent, claim 12.

54. In my opinion, the terms “substantially uniform”, “substantially equal level of illumination”, “a uniformity . . . remains substantially unchanged”, and “the uniformity of light . . . remains substantially the same” are indefinite. In particular, the Asserted Patents state that if obtains “evenly” illuminated display surfaces by avoiding the “uneven illumination” that creates “hot spots” (’410 Patent, 2:49-64). On the other hand, the Asserted Patents also define “evenly” (i.e., a ratio of 3:1 between average illumination and minimum illumination) in a manner that allows the display to be illuminated with dead spots and hot spots, as permitted by the 3:1 ratio. Because these disclosures contradict each other by requiring that hot spots *not* be created for

“even” illumination, and by also allowing hot spots when a surface is “evenly” illuminated, a POSITA would not be able to determine with reasonable certainty whether the display is illuminated with substantially uniform lighting.

55. Moreover, Ultravision’s construction, requiring that there be no “noticeable unevenness, such as hot spots or dead spots” is inconsistent with the disclosures in the Asserted Patents allowing a 3:1 ratio of average illumination to minimum illumination.

56. The terms “substantially uniform”, “substantially equal level of illumination”, “a uniformity . . . remains substantially unchanged”, and “the uniformity of light . . . remains substantially the same” are all used in the same context of describing uniformity of light illumination from the LEDs onto a display surface in the relevant Asserted Claims. The terms arise in the following claim limitations of the Asserted Patents:

- ’410 Claim 1[c]: “wherein the light from each of the LEDs is directed through the first lens element and the second lens element across the entire area of the display surface so that each LED evenly illuminates substantially the entire display surface with a ***substantially equal level of illumination*** from each of the LEDs.”
- ’410 Claim 10: “wherein the light intensity from each lens is ***substantially uniform*** across the entire display surface”
- ’410 Claim 15: “wherein the light from each of the LEDs is directed by the acrylic material substrate across the entire area of the display surface so that each LED evenly illuminates substantially the entire display surface with a ***substantially equal level of illumination*** from each of the LEDs.”
- ’410 Claim 21: “wherein the light from each of the LEDs is directed by the acrylic material substrate across the entire area of the display surface so that each LED evenly illuminates substantially the entire display surface with a ***substantially equal level of illumination*** from each of the LEDs”
- ’738 Claim 19: “wherein the optical elements are configured so that failure of one or more LEDs of the lighting assembly will cause the illumination level of light impinging the substantially rectangular region to decrease while ***the uniformity of light*** impinging the substantially rectangular region ***remains substantially the same.***”

- '738 Claim 20: "wherein the lighting assembly is configured so that if one or more LEDs of the third plurality of LEDs fails, *the uniformity of the light* impinging the substantially rectangular region *remains substantially the same*."
- '248 Claim 3: "The lighting assembly of claim 1, wherein the optical elements are configured so that after failure of one or more of the LEDs *a uniformity* of the light emitted from the lighting assembly *remains substantially unchanged*."
- '946 Claim 12: "The light assembly of claim 1, wherein the light assembly is further configured to provide illumination redundancy such that failure of some of the LEDs will cause an illumination level of light emitted from the light assembly to decrease while *a uniformity* of the light emitted from the light assembly *remains substantially the same*."

57. Each of the Asserted Patents defines "evenly" in the context of illuminating a display surface to require a 3:1 ratio of average illumination to minimum illumination:

- '410 5:9-21; '738 5:67-6:11; '248 6:10-22; '946 6:30-41: "In one embodiment, the rectangular target area of the surface 102 would be *evenly illuminated* by the LED 416, while areas beyond the edges 112, 114, 116, and 118 would receive no illumination at all or at least a minimal amount of illumination from the LED 416. *What is meant by "evenly"* is that the illumination with *a uniformity that achieves a 3:1 ratio of the average illumination to the minimum*. Thus, by designing the lens in such a manner, when all LEDs are operating, the light from the collective thereof will illuminate the surface at the *3:1 ratio*. When one or more LEDs fail, the overall illumination decreases, but the uniformity maintains the same uniformity."

In other words, using this definition, for the display surface to be "evenly" illuminated, the average illumination on the display surface is three times the minimum illumination of the display surface.

58. While the patents define this 3:1 ratio as what is meant by "evenly" illuminated, they also disclose that the purported invention removes "uneven illumination" that creates "hot spots":

- '410 2:55-61; '738 3:37-43; '248 3:45-52; '946 3:67-4:7: "One problem with *uneven illumination* is that certain parts of the surface 102 may be more brightly illuminated than other parts. This creates "*hot spots*" that may be undesirable. Attempting to evenly illuminate the surface 102 may cause light to be directed past the edges 112, 114, 116, and 118 as attempts are made to balance out hot spots in particular areas."

59. And finally, the patents say that the disclosed embodiments prevent “dead spots” on the display surface by maintaining the 3:1 ratio of uniformity:

- ’410 5:33:38; ’738 6:24-30; ’248 6:35-41; ’946 6:54-60: “The minimum distance is designed such that overlapping light from adjacent LEDs does not create interference patterns [sic] and result in *dead spots* on the surface. The lens structure 522 is designed to create the 3:1 uniformity and also, the lens structure is designed to “direct” the light from an edge of the surface to cover the entire surface”

60. These disclosures of not producing hot spots and dead spots to avoid “uneven” illumination while at the same time having a 3:1 ratio of average illumination to minimum illumination to be “evenly” illuminated are contradictory, since the 3:1 ratio will create hot spots and dead spots. Thus, a POSITA would not understand what is meant by “evenly” illuminating or “uniform” illumination in the patents.

61. It is important to understand what the 3:1 ratio, as discussed in the patents, represents. A 3:1 ratio means that the average illumination is three times greater than the minimum illumination. If the ratio were 2:1, then the lighting would be more uniform. And if the ratio were exactly 1:1, the illumination would be uniform with equal levels of illumination across the entire display. On the other hand, if the ratio were 5:1, the illumination would be even less uniform.

62. A ratio of 3:1 between the average illumination and the minimum illumination necessarily results in non-uniformity, as in hot spots and dead spots. For example, in my experience, it is often the case that adjacent spots of higher illuminance and lower illuminance gives rise to noticeable non-uniformity of lighting on a surface, especially if the difference was at a ratio of 3:1. One way to think of this is to sit in a room, and then dim the lights to one-third the illuminance level of their original level. The effect of this would be quite noticeable. If regions on a billboard were to have this difference in illumination next to each other, these different regions would appear as “hot” spots or “dark” spots on the billboard. Indeed, lighting guidelines suggest that a ratio of 3:1 in illuminances is useful to make certain features stand out compared to the

background when wanting to draw a viewer's attention to a feature. IESNA, *The Lighting Handbook* (10th Ed.) (UVT-LFH00001190 at § 12.7).² In other words, a ratio of 3:1 in illuminance would create hot spots and dead spots when used on a billboard as disclosed in the patent.

63. Consistent with my experience, the OAAA guidelines on outdoor advertising discloses that it is necessary to maintain a ratio of no more than 3:1 for **maximum to minimum** illumination (as opposed to average to minimum illumination). OAAA, 2588. If the ratio of maximum to minimum illumination must be less than 3:1 to avoid hot spots, then the ratio of average to minimum illumination would necessarily be smaller than this (e.g., 2:1) to avoid hot spots. This further confirms that the patents' disclosure of a ratio of 3:1 for the average uniformity to the minimum uniformity (how the patents define "evenly") would create hot spots.

64. I also note that the patent uses "uniformity" inconsistently with how the term is used in the field. When considering billboard illumination, people in the field refer to the ratio of the **maximum** illumination to minimum illumination, and not ratio of the average illumination to minimum illumination. For example, the OAAA LED lighting Guidance for Outdoor Advertising Owners and Operators ("OAAA") (UVT-LFH00002586) points to the "min-to-**max** illumination" (*i.e.*, the ratio of the largest to smallest readings taken on a display surface) as important when attempting to avoid hot spots. OAAA at 2588. Similarly, the Illuminating Engineering Society ("IESNA") relies on the ratio between the maximum and minimum illuminations to determine uniformity, and not the average to minimum illumination ratio. IESNA, RP-19-01, Roadway Sign Lighting (UVT-LFH00001124 at § 5.5).³

² While the 3:1 ratio in illuminances described in the IESNA Handbook for making features stand out is the ratio of overall illuminance of the feature to the overall illuminance of the background, the concept is still the same: By having a ratio of 3:1 between illuminances on a surface, the lighting will be uneven and hot spots and/or dark spots will be produced.

³ I understand that Ultravision has identified IESNA, *Lighting for Exterior Environments* (UVT-LFH00001140) as having relevant disclosure for this limitation. But this disclosure does not relate to the illumination of a display surface, but instead is intended for lighting of parking lots and sidewalks, with the primary considerations being the

65. The reliance on the ratio of the maximum and minimum illuminations is used instead of the ratio of the average and minimum illuminations because it is necessary to limit the extremes in illumination to prevent hot spots and dark spots. For example, it is possible to maintain a small ratio of average illumination to minimum illumination on a large billboard, but to have a small region with a very high illumination that creates a “hot spot” in that small region. Because the region with the hot spot is so small, its impact on the average illumination is very small. As an example, consider a billboard with a size of 100 square feet had a perfectly constant illumination of 100 lux across 99 square feet of the entire surface, with one square foot in the middle with an illumination of 10000 lux. In this case, the average illumination would be given by:

$$\begin{aligned} (99 \times 100 + 1 \times 10,000)/100 \text{ lux} &= (9,900+10,000)/100 \text{ lux} \\ &= 19,900/100 \text{ lux} \\ &= 199 \text{ lux} \end{aligned}$$

As a result, the ratio of the average illumination to the minimum illumination would be 199:100, or 1.99:1. The display is “evenly” illuminated under the patent’s definition, and since it is better than the 3:1 ratio required by the patents. But the ratio between the illumination of the brightest spot on the billboard and the rest of the billboard is 100:1. This is the type of ratio that one might expect if, for example, the billboard were very dimly lit, and a person standing next to the billboard held a very bright flood light mere inches from the billboard. This would certainly create a very bright “hot spot” on the display surface, but, according to the patents, this would be “evenly illuminated” or “uniform.”

66. For the foregoing reasons, a POSITA would not be able to determine with reasonable certainty the scope of “substantially uniform”, “substantially equal level of

illumination of objects in the area to ensure safety and security, and to assist with crime prevention. *Lighting for Exterior Environments*, § 3.1.

illumination”, “a uniformity . . . remains substantially unchanged”, and “the uniformity of light . . . remains substantially the same”, as those phrases are used in the Asserted Claims.

67. Ultravision’s construction is incorrect because it is inconsistent with the disclosures of the patents. In particular, Ultravision’s construction of “substantially uniform” and related terms as illumination that “does not create noticeable unevenness, such as hot spots and dead spots” is inconsistent with the Asserted Patents’ disclosure that a display surface with an average-to-minimum uniformity ratio of 3:1 is “evenly” illuminated. As I explain above, an average-to-minimum uniformity ratio of illumination of 3:1 would exhibit a noticeable variation in brightness that would allow for hot or dead spots.

E. “minimal amount of illumination”/ “areas beyond edges ... receive minimum illumination”

Ultravision’s Proposed Construction	Defendants’ Proposed Construction
“compliant with IES recommended light trespass guidelines”	Indefinite

68. The term “minimal amount of illumination”/ “areas beyond edges ... receive minimum illumination” appears in at least the following claims: ’410 Patent, claims 1, 10, 15, 21; ’738 Patent, claim 19; ’248 Patent, claim 3; ’946 Patent, claim 12.

69. It is my opinion that a POSITA would not have understood the terms “minimal amount of illumination” and “areas beyond edges ... receive minimum illumination” in the identified claims of the ’738 and ’413 Patents to have a reasonably certain meaning because neither the patent nor the industry provides any factors or other objective indicators that would allow a POSITA to determine how much illumination is “minimal illumination.”

70. First, I notice that the term “minimal . . . illumination” only appears once in the specification. ’413 Patent, 5:17-21 (“the rectangular target area of the surface 102 would be evenly illuminated by the LED 416, while areas beyond the edges 112, 114, 116, and 118 would receive

no illumination at all or at least a minimal amount of illumination from the LED 416”). The term “minimum illumination” never appears in the specification.

71. Additionally, the IES recommends light trespass guidelines recommend certain light trespass limitations. *See* Ex. IES Light Trespass Guide at 4. However, the IES provides that variability among observers is expected. *Id.* Indeed, IES cautions against adopting a set of universal recommended light trespass limitations because the light trespass test results may range from highly objectionable to not objectionable depending on the individual observer. *Id.*, 4-5 and 8. Furthermore, Table 1 in IES refers to geographical locations as locations at the property line, not a billboard. *Id.*, 6-7.

72. It is my opinion that the level to which light is objectionable in the areas beyond edges is not defined by the term “minimal amount of illumination” and as discussed in IES. The analytical value for what is acceptable and what minimum light level is in quantitative terms must be defined in terms of foot candles beyond the edges of the billboard, as it would be determined by a calibrated light meter for the particular wavelength of light coming from the luminaire. In other words, a POSITA would not know what constitutes minimal illumination without an objective criteria for making that determination. Thus, the terms of “minimal amount of illumination” and “areas beyond edges ... receive minimum illumination” do not quantify what level is acceptable nor what minimum should be.

F. “desired [uniformity ratio]”

Ultravision’s Proposed Construction	Defendants’ Proposed Construction
<i>plain and ordinary meaning</i>	Indefinite

73. The term “desired [uniformity ratio]” appears in at least the following claims: ’410 Patent, claim 4.

74. It is my opinion that a POSITA would not have understood the term “desired [uniformity ratio]” in the identified claim of the ’410 Patent to have a reasonably certain meaning because the patent fails to provide sufficient factors, tests or other objective indicators that would allow a POSITA to determine whether a uniformity ratio is “desired.”

75. As an initial matter, I notice that the term “desired [uniformity ratio]” never appears in the specification of the ’410 Patent. Instead, claim 4 is the first instance that this term appears in the context of uniformity ratio. However, this context does not suggest or provide any meaningful definition for the term “desired” itself.

76. Claim 5 of the ’410 Patent requires that “the uniformity ratio is 3:1,” which implies that the “desired” uniformity ratio in claim 4 should be larger in scope. However, I found that the 3:1 ratio recited in claim 5 is the only ratio the specification of the ’410 Patent offers. ’410 Patent, 5:14-16. There is simply no support, guidance, or criteria for POSITA to use in the ’410 Patent to determine what ratios would be acceptable.

77. A POSITA would understand that a “desired” uniformity varies depending on the application, use, or user preference. A POSITA would understand that what is typically desired as it pertains to “desired” uniformity when a billboard is illuminated is for there to be no differences in illumination light levels anywhere on the billboard. However, even when such illumination is desired, a POSITA understands that this is not practically possible. Therefore, a POSITA understands that “desired” uniformity is an open-ended issue and that what is acceptable to one observer is not acceptable to another observer. Therefore, “desired” has no definitive meaning as it applies to the observer. Further, the ’410 Patent’s teaching of a 3:1 target ratio for uniformity only exacerbates this problem. Perfect uniformity is a 1:1 ratio. Yet, the ’410 Patentee only teaches achieving a 3:1 ratio, which is nothing more than the patentee’s preferred ratio. A

POSITA would not necessarily consider that a 3:1 average to minimum ratio is “desired.” Rather, a POSITA would consider a ratio as close as possible to a 1:1 ratio (because a 1:1 ratio is not practically possible) to be the “desired” uniformity and would typically be the goal of external lighting for a billboard. But “as close as possible” does not add any clarity or definiteness to the boundary of this term. Thus, whether a uniformity ratio is “desired” is not something on which there can be a single objective judgement, but instead may be subject to multiple opinions by observers and designers of lighting products.

78. Finally, like the '410 Patent specification, the prosecution history does not provide any objective guidance as to the meaning or scope of the “desired [uniformity ratio].” The Applicant for the application that issued as the '410 Patent referred to the “desired [uniformity ratio]” as it is claimed and did not provide any additional context or other information that would provide a POSITA with objective guidance to determine the meaning or scope of the phrase.

79. Therefore, it is my opinion that the claim, specification and the prosecution history of the '410 Patent do not provide any objective standard that a POSITA could apply to determine the meaning or scope of “desired [uniformity ratio].” Because the intrinsic record of the '410 Patent is devoid of any objective guidance, my opinion is that a POSITA would not be able to determine the meaning or scope of “a desired uniformity ratio of average illumination to minimum illumination” with any reasonable certainty. As such, it is my further opinion that, in light of the inclusion of the “desired [uniformity ratio]” limitation, claim 4 of the '410 Patent, when read in light of the specification and prosecution history, fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention as set forth in the claim.

G. “[optics panel is configured to be attached to] a heat sink comprising a power supply enclosure disposed on the heat sink”

Ultravision’s Proposed Construction	Defendants’ Proposed Construction
<i>plain and ordinary meaning</i>	<p>“[optics panel is configured to be attached to] a structure for increasing heat dissipation from the optics panel on which a power supply enclosure is placed or arranged”</p> <p>Or</p> <p>Indefinite</p>

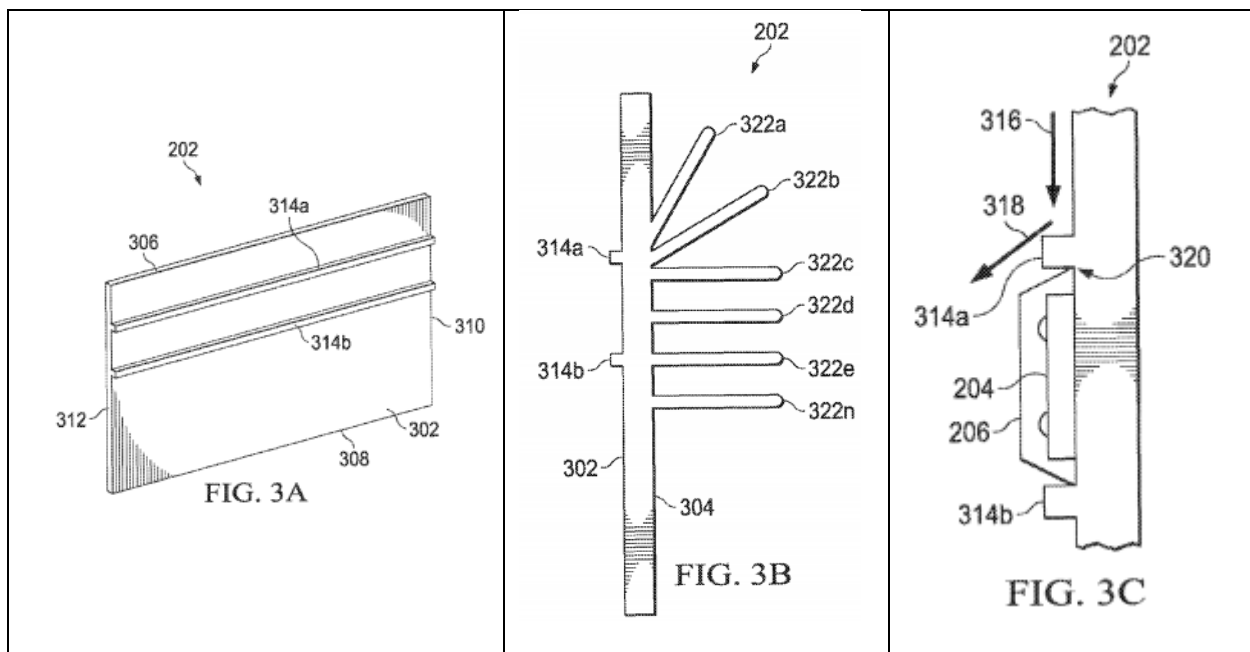
80. The term “[optics panel is configured to be attached to] a heat sink comprising a power supply enclosure disposed on the heat sink” appears in at least the following claims: ’410 Patent, claim 11; ’413 Patent, claim 11.

81. Claim 11 of the ’410 and ’413 Patents each require “[a]n optics panel for use in a light emitting diode (LED) lighting assembly for illuminating a billboard” wherein the “optics panel is configured to be attached to a heat sink comprising a power supply enclosure disposed on the heat sink.” ’410 Patent, claim 11; ’413 Patent, claim 11. In my opinion, and based on the intrinsic evidence, a POSITA would understand that there is a structural relationship between these three claim elements, namely that the “optics panel” is attached to a “heat sink” that dissipates heat generated by the optics panel and, a “power supply enclosure” is disposed on the “heat sink.”

82. As a starting point, the claim language in a vacuum is not reasonably clear in that it refers to “a heat sink comprising a power supply enclosure disposed on the heat sink.” *Id.* The structural relationship between the “heat sink” and the “power supply enclosure” is described in

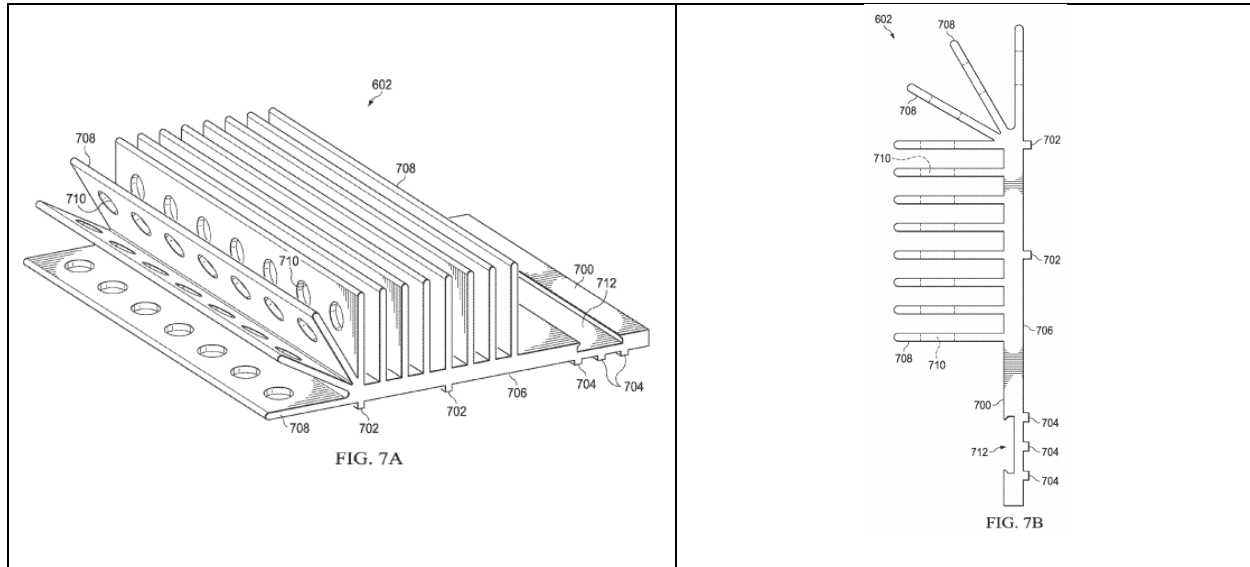
two very different ways (*e.g.*, “comprising” and “disposed on”), which can be understood to be inconsistent and conflicting.

83. However, this claim language is more clear when read by a POSITA in the context of the specification. According to the specification of the ’410 Patent (which is common to all of the Asserted Patents), the “heat sink” is described in connection with two non-limiting embodiments for FIGs. 3A-C, 6A-C and 7A-B. ’410 Patent, 3:64-4:13; 7:27-39. These two embodiments are consistent in their description of the “heat sink.” As illustrated below (and with reference to FIGs. 3A-C as an example), a POSITA would understand that the Asserted Patents describe a flat plate “back panel” with fins on a “back surface”, that together form the “heat sink.” *Id.*, 3:64-4:3; 7:21-29. A POSITA would understand that the specification discloses a “back surface 304” of a flat “back panel” which “may be configured to increase dissipation. For example, the back surface 304 may be configured with a heat sink provided by fins 322a-322N, where N denotes a total number of fins.” ’410 Patent, 3:64-67. The specification further states that the “optics panel 206” is mounted on a “front surface” of the “back panel.” *Id.*, 3:30-35; 3:47-49.



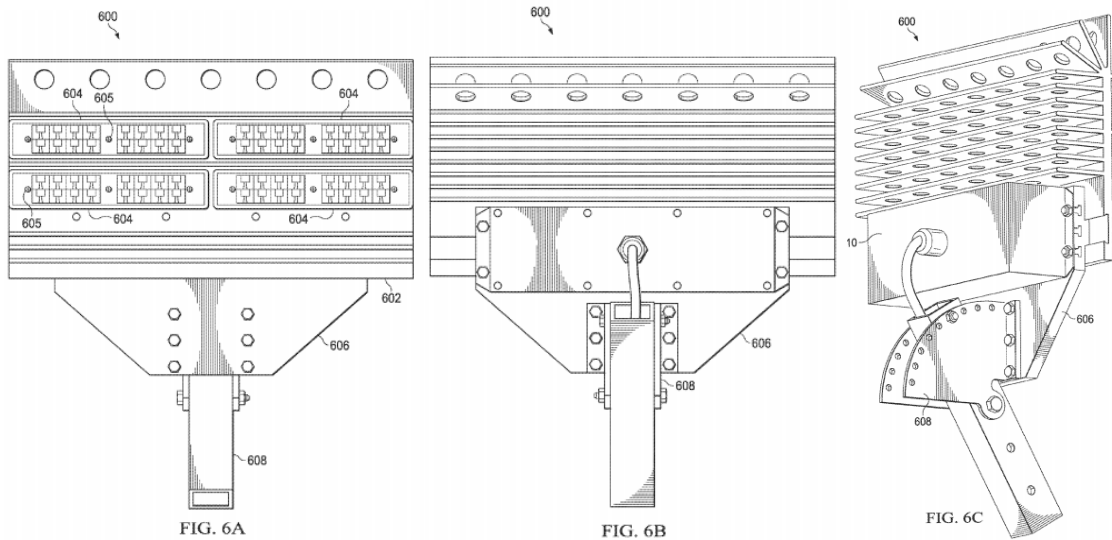
41. A POSITA would understand that the figures are related because the specification states that “FIG. 3C illustrates one embodiment of the back panel of FIGS. 3A and 3B with a light panel and an optics panel that may also be used in the lighting assembly of FIG. 2.” *Id.*, 1:41-42.

84. As previously stated, the embodiment of the “heat sink” in FIG. 7A-B is structurally similar (see below).



85. Additionally, the specification states that “FIGS. 6A-6C illustrate a more detailed embodiment of the lighting assembly of FIG. 2.” *Id.*, 1:51-52. A POSITA reading the specification (and with reference to FIGs. 6A-6C), would understand that the “power supply enclosure 610” is disposed on the flat “back panel” “back surface” which is the same side as the “fins” that form the “heat sink.” *Id.*, 7:4-16; 7:21-29. The “light assembly 600” described in FIG. 6 includes a “mounting plate 606” for which the “power supply enclosure 610” may be coupled. *Id.*, 7:9-12. In my opinion, a POSITA would understand that the “power supply enclosure” is disposed on the

flat “back panel” plate of the “heat sink” because the specification states that the “fins 322a-322n increase the surface area of the back surface 304” of the “back panel 202.” *Id.*, 3:30-35; 3:47-49.



86. The relationship between the “optics panel”, “heat sink” and “power supply enclosure” is apparent in light of the advantages described in the specification: “[i]t is noted that separating the power supply from the back panel 602” using a “mounting plate” “may aid in heat dissipation by the back panel 602 as it does not have to dissipate heat from the power supply to the same extent as if the power supply was mounted directly to the back panel 602.” *Id.*, 7:12-16. Furthermore, it is clear that the “power supply enclosure” is located on the opposite exterior surface of the “heat sink” (*i.e.*, finned back panel) to enhance heat dissipation from the power supply and not interfere with heat dissipation from the optics panel. *Id.*, 7:17-20. For example, the specification describes that the disclosed “location of the power supply may also be beneficial as snow not melted by the heat produced by the LED may be melted by heat produced by the power supply” which “may aid in reducing snow buildup on the LEDs.” *Id.*

87. The specification’s disclosure of the relationship between the “heat sink” and the “power supply enclosure” is reflected in Defendants’ proposed construction. Disagreement with Defendants’ proposed construction suggests that Ultravision disagrees with that construction and

may interpret the claims to permit a different relationship between the optics panel, heat sink and power supply enclosure.

88. Likewise, I have been informed by counsel that Ultravision has identified a light fixture housing (*i.e.*, an enclosed cavity for the internal components of the light fixture) as the “power supply enclosure” for the accused product and has taken the position that the “heat sink” may be disposed inside the light fixture enclosure and between the power supply and enclosure; not attached to the optics panel. Ultravision’s claim interpretation is inconsistent with how a POSITA would understand the claim limitation in view of the specification, which discloses that the “power supply enclosure” contains the “power supply” and the “power supply enclosure” is placed or arranged on the “heat sink.” *Id.*, 7:9-12. In my opinion, a construction that encompasses a structural relationship such that a “power supply enclosure” can be formed around the “heat sink” or that the “power supply enclosure” is not a distinct and separate element from the “heat sink” is unfounded, illogical, and is inconsistent with the specification for the Asserted Patents as it would be understood by a POSITA. In my opinion, a POSITA would understand that there are two primary sources of heat during the operation of a LED luminaire. One source is the power supply and the other source is the LED devices that also generates heat. A POSITA would understand that the power supply would typically have an enclosure and in order to dissipate the heat from the power supply, the enclosure for the power supply would normally be mounted on a heat sink. A POSITA would also understand that the LED light engine that includes the PCB and the LEDs that are mounted on it, would be attached to the heat sink as well in order to affect the lowest possible operating temperature. A POSITA would also understand that the optics panel containing the lenses that are positioned to redirect light from the LEDs would be positioned over top of the LED panel. Therefore, a POSITA would not assume that the optics panel is attached to the heat sink,

but rather that the optics panel is a free standing component that is suspended over the LED panel with no contact to the heat sink, except that it is attached to the LED panel that in turn is attached to the heat sink. Consequently, in claim 11 of the '410 Patent, "wherein the optics panel is configured to be attached to a heat sink comprising a power supply enclosure disposed on the heat sink", it is not understandable since optics panels are typically designed to be free standing and located over top of LED panels.

89. However, if Ultravision's construction is feasible, the existence of two inconsistent constructions would create reasonable uncertainty to a POSITA as to the scope of the proper claim limitation. Under that scenario, it is my opinion that the claim is indefinite because it fails to inform a POSITA with reasonable certainty what the scope of the invention is.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct.

Executed this 9th day of June in 2020.



Dr. Jack Josefowicz

Appendix A

2289 Silver Spring Drive, Westlake Village, CA 91361

Dr. Jack Josefowicz

Cell: (310) 874-2261

PROFESSIONAL COMPETENCE OVERVIEW:

Dr. Jack Josefowicz's background includes basic research and downstream "real world" issues in electronic materials, electronic micro-devices, electronic systems design and failure analysis. Additionally, Dr. Josefowicz has expertise in surface science, thin films for both optical and electronic applications for Light Emitting Diode (LED) device design, LED light fixture design and optimization, LED Light Engine printed circuit boards (PCB), LED assembly on metal core PCBs including pick and place SMD LED devices and reflow assembly, SMD surface finish materials expertise, advanced electronics for LED power supply drivers and controllers, electronic system reliability, semiconductor devices, Li-Ion battery development for space satellites, and manufacturing, product design and development; with strong communication skills in making science and engineering accessible to non-experts and experts alike.

Dr. Josefowicz is currently an independent consultant, working with both the commercial and aerospace electronic industries. Dr. Josefowicz has worked with law firms to support litigation, defend patent infringement cases and served as an expert witness in legal mediation cases. Dr. Josefowicz is an expert in electronic system reliability prediction analysis, electronic systems failure and root cause analysis, electronic fabrication "best practice" and printed circuit through electronic system assembly. Dr. Josefowicz has successfully determined the "root cause" for electronic system failures that often involve system design that impacts overheating of devices that end up causing fires. In one expert witness case, Dr. Josefowicz's expert witness in expert report led to a positive settlement in favor of his client where the liability was over \$Billion.

Dr. Josefowicz's career started with basic research, including industrial R&D (at Hughes Research Laboratories (HRL)) as well as the university research environment as Professor of Material Science and Engineering (University of Pennsylvania). Projects at HRL included design and fabrication of unique thin film depositions systems, including sputtering, e-beam evaporation, chemical vapor deposition, induction heat deposition and other methods where the thin films were applied to optical and electronic systems. Having established a reputation in several science fields through publications and patents, the past 15 years has also included Light Emitting Diode (LED) lighting design applications as well as R&D and applied development work in manufacturing. As Executive VP of Technology, Dr. Josefowicz helped found LED Roadway Lighting Limited and led the design of new globally acclaimed high efficiency and high reliability LED street lights, including electronics power supply driver, LED control systems including dimming and on/off controls, optics design, and fixture housing design for optimized thermal management. Dr. Josefowicz also directed the qualification of suppliers for all the components that included, electronic devices and components, PCB suppliers, die cast and mould design for lean and design for manufacturing, as well as parts and system integration. The intimate bridging between R&D and manufacturing design were pursued and were critical to high yield and reliability of the manufactured parts. As Global Director of Technology and R&D (Tycoelectronics-\$1.2 Billion Division), applying the experience in basic research, Dr. Josefowicz headed divisions including advanced PCB design, PCB thin film surface finishes, design for reliability, process manufacturing optimization and automation of complex manufacturing processes facilities within Tycoelectronics in 9 manufacturing factories, including "best practice", statistical process control, design for manufacturing and reliability testing.

During his tenure at Tycoelectronics, Dr. Josefowicz headed a task force for contingent liabilities and was the lead in 42 cases that had an exposure of over \$100M. In those cases, all the analysis, report writing, and defense was performed by Dr. Josefowicz. Since becoming an independent consultant, Dr. Josefowicz has been engaged as an expert, performing analysis and defense, and in all cases the plaintiffs settled without trial or legal circumstances. Most recently, Dr. Josefowicz was expert witness on a case that had exposure to over \$1 Billion. The case was settled in favor of Dr. Josefowicz's client based on his analysis and report. Dr. Josefowicz also served as expert witness in litigation cases involving patent infringement.

2289 Silver Spring Drive, Westlake Village, CA 91361

Technology Expertise:

1. LED light design:
 - a. LED device design including semiconductor p-n junction fabrication and phosphor wavelength conversion materials science
 - b. Optics for LED devices
 - c. Optics design for street lighting applications
 - d. Power supply driver electronics including dimming and on-off controls
 - e. Luminaire fixture design and thermal management design
 - f. Driver electronics reliability prediction analysis using Telcordia SR332
2. Thin Film Surface Finish Performance and Evaluations – Failure Root Cause Analysis
3. Thin film coating technology, including vacuum deposition design of equipment for plasma sputtering, electron beam deposition, RF plasma, and chemical vapor deposition.
4. Printed Circuit Design, Manufacturing Process Design for “Best Practice”
5. Li ion battery design, materials development and engineering optimization (liquid and polymer gel ionic separator selection and design); thin film coating technology (doctor blade, spray and spreading methodologies), including testing; charging and discharging characteristic analysis and optimization.
6. Molecular and Atomic analysis using Atomic Force Microscopy; Scanning Tunneling Microscopy for material science investigations of metals and insulators (ceramics, plastics, oxides, organometallics).
7. Expertise (hands on) in thin film coating methods including:
 - a. Thermal evaporation
 - b. Chemical Vapor Deposition
 - c. Radio frequency discharge deposition
 - d. Electron beam evaporation
 - e. Sputtering deposition
8. Electronic Reliability Prediction Modeling and Design for Long Life

WORK EXPERIENCE:

- A. Independent Consultant**
- B. LED Roadway Lighting Limited – Halifax, Nova Scotia, Canada
Executive VP, Technology Solutions and Head of R&D 2008 – 2012**
- C. Tycoelectronics/Printed Circuit Group – Los Angeles, CA
Director of Technology and R&D 1996 – 2008**
- D. Hughes Research Laboratory-Malibu, CA
Principle Scientist and Project Leader 1984 - 1996**

Direct manufacturing and operations in new emerging technology, overseeing the Tycoelectronics Printed Circuit Group, Aerospace, Military-High Reliability-10 manufacturing facilities >**\$1Billion Sales**

Provide technical support as task force leader for key \$10Million+ customer accounts, including System Design, lead failure analysis, technology workshops and technology roadmap development to meet customer future business opportunities

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**D. University of Pennsylvania (PEN) & Hughes Research Laboratory Collaboration, Philadelphia, PA
Professor of Material Science and Engineering, 1991 – 1996**

Developed research and development industrial research program between PEN and Hughes Research Laboratory directed at Lithium Ion Batteries for satellites at Hughes Space & Communications Division.

**E. Hughes Research Laboratories, Malibu, CA
Program manager: superconducting materials & IC device development: 1984 – 1996**

Establish collaborative program (DARPA) between Hughes Research Labs and University of Pennsylvania (Penn) for the research and development of advanced solid state thin film lithium polymer electrolyte batteries for Space Satellites; introduced the first Atomic Force Microscopy laboratory at Penn for atomic analysis of materials.

Designed and fabricated Plasma RF Sputtered Superconducting Lattice Matched-on Sapphire Thin Films for Radio Frequency Devices band pass filters for space satellite applications
Program Lead: high temperature superconductors: DARPA Superconductor thin films program

Fabricated the world's first gallium arsenide high speed integrated circuits using self aligned field effect transistors with pure tungsten gates; fabrication of large scale high speed integrated circuits using simple and reliable processes.

**F. Harvard University: Cambridge, MA
Research Associate; 1975-1980**

EDUCATION:

PhD 1975 Physics, University of Waterloo, Waterloo, Ontario, Canada

BSc 1969 Mathematics & Physics, Concordia University, Montreal, Quebec, Canada

TEACHING RELATED EXPERIENCE:

- **Harvard University:** Associate Research Scientist
- **University of Pennsylvania:** Professor in Material Science and Engineering
- **Technical Reviewer:** Thin Solid Films and other journals
- **Invited Lecturer:** Technology Workshops and Presentations at: Cisco, Celestica, Flextronics, Solectron, Jabil, Northrop Grummund, Motorola, Nokia, Raytheon, Boeing; and many other companies.

2289 Silver Spring Drive, Westlake Village, CA 91361

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- 5) Jack. Y. Josefowicz, L. Hayashi, S. S. Roberts and J. W. Sibert, "METAL ELECTROLYSIS USING A LOW TEMPERATURE BATH". U.S. Patent issued July 17, 1986, Patent number: 4,595,466
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- 12) Jack. Y. Josefowicz, "POLYANILINE CARBON COMPOSITE CATHODE FOR THIN FILM BATTERIES". U.S. Patent issued Sept. 19, 1995, Patent number: 5,451,476
- 13) Jack. Y. Josefowicz, "APPARATUS AND METHOD FOR COATING A MULTILAYER ARTICLE". Patent issued April 11, 2000, Patent number: 6,048,584.
- 14) Jack. Y. Josefowicz, John Adam Christopher Roy, Adam Frederick Chaffey "Light Emitting Diode Roadway Lighting Optics," US Patent 20110194281-August 11, 2011.
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- 17) Jack. Y. Josefowicz, Alan Shawn Winters, Qiuning Chen, Mark Adam Neary "Power Supply for LED Roadway Lighting Fixture," US Patent 20120001566-January 5, 2012.
- 18) Jack. Y. Josefowicz, John Adams Christopher Roy, Adam Frederick Chaffey "Light Emitting Diode Roadway Lighting Optics," US Patent 8651693-February 18, 2014.
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